

c. Amendments to Claims

1. (currently amended) A process for transmitting digital data to an A/D converter via an analog channel, comprising:

generating a sequence of output signals by precoding a sequence of input signal points to precompensate for ISI in the analog channel, the generating being such that at least one of the output signals would be distorted by the channel ISI to a signal representative of a signal point lying between quantization levels of the A/D converter in an absence of channel noise and echo if the precoding matches the ISI, and others of the output signals would be distorted by the channel ISI to signals representative of signal points that are quantization levels of the A/D converter in an absence of channel noise and echo if the precoding matches the ISI, a majority of the input signal points being are quantization levels of the A/D converter; and

wherein the precoding further comprises:

precompensating an input signal point for the ISI; and

adding a modulo amount to the precompensated signal point in response to the precompensated signal point having a value outside of a threshold range.

2. (original) The process of claim 1, wherein the quantization levels are the quantization levels of a PCM vocoder.

3. (canceled)

4. (currently amended) The process of claim 3 1, wherein the adding includes determining the value of the modulo amount in a manner responsive to the value of the input signal point that was precompensated.

5. (original) The process of claim 4, wherein the threshold range is dependent on the value of the input signal point that was precompensated.

6. (original) The process of claim 4, wherein the threshold range is independent of the value of the input signal point that was precompensated.

7. (original) The process of claim 1, wherein another of the output signals would be distorted by the ISI to a signal representative of a signal point lying between quantization levels of the A/D converter, first and second ones of the output signals lying between different pairs of quantization levels.

8. (currently amended) The process of claim 1, wherein each of the input signal points is representative of a value of a quantization level of the A/D ~~D/C~~ converter.

9. (currently amended) A transmitter for transmitting digital data to an A/D converter via an analog channel, the transmitter comprising:

a precoder being configured to precompensate a sequence of input signal points of an original constellation for ISI in the analog channel ~~and being characterized by an original constellation and~~ such that the channel would convert the precompensated points into signal points of an extended constellation in the absence of channel noise and echo, a ~~majority of the signal points of the original constellation being quantization levels of the~~ A/D converter, and the extended constellation including at least one signal point that is not a quantization level of the A/D converter; and

wherein the precoder comprises:

a digital filter to generate feedback signal points from precompensated signal points produced from the input signal points by the precoder;

an adder to combine the feedback and associated input signal points; and

a modulo device to produce a signal point within a threshold range from a signal point received from the adder.

10. (original) The transmitter of claim 9, wherein the quantization levels characterizing a portion of the points in the constellations are quantization levels of a PCM vocoder.

11. (currently amended) The transmitter of claim 10, further comprising:

a trellis encoder to produce the input signal points by encoding digital data, the trellis encoder is being coupled to transmit the input signal points to the precoder.

12. (original) The transmitter of claim 11, wherein the trellis encoder is configured to produce signal points representative of the quantization levels of the PCM vocoder.

13. (original) The transmitter of claim 10, wherein the precoder trellis encodes the input signal points and further produces signals representative of signal points of the original constellation in response to being configured to precompensate for zero ISI in the analog channel.

14. (canceled)

15. (currently amended) The transmitter of claim ~~14~~ 9, wherein the modulo device is configured to add a modulo amount to a signal point received from the adder in response to the received signal point not having a value in the threshold range.

16. (currently amended) The transmitter of claim ~~14~~ 9, wherein the threshold range is dependent on the value of the input signal point that was precompensated.

17. (currently amended) The transmitter of claim ~~14~~ 9, wherein the threshold range is independent of the value of the input signal point that was precompensated.

18. (original) The transmitter of claim 15, wherein the modulo device is configured to determine the threshold range from the value of the associated input signal point.

19. (original) The transmitter of claim 9, wherein the extended constellation includes a plurality of signal point values that are not equal to quantization levels of the A/D converter.

20. (withdrawn) A process for communicating data over an analog channel in both downstream and upstream directions, comprising:

monitoring a quantity representative of an echo level caused by downstream data transmission;

resetting a power level for downstream transmissions over the analog channel to a lower value in response to determining that the echo level interferes with upstream data transmissions over the analog channel.

21. (withdrawn) The process of claim 20, further comprising:

channel encoding data prior to transmitting the data downstream; and

decoding upstream transmitted data to recover the data.

22. (withdrawn) The process of claim 20, further comprising:

resetting includes selecting a constellation for the downstream data transmission that produces a lower average power level on the analog channel.

23. (withdrawn) The process of claim 20, wherein the echo level changes the amount of quantization noise in upstream transmitted data.

24. (withdrawn) A transceiver for transmitting and receiving digital data via a mixed channel that includes a digital network and an analog channel serially connected to the digital network, comprising:

a transmitter capable of error-encoding digital data and of transmitting encoded data downstream to a target transceiver via the mixed channel; and

a receiver capable of error-decoding received digital data transmitted upstream from the target transceiver via the mixed channel, the transmitter configured to reduce downstream transmission power in response to determining that echo from downstream transmissions interferes with upstream transmissions from the target transceiver.

25. (withdrawn) The transceiver of claim 24, wherein the transmitter is configured to lower the downstream transmission power in response to determining that the power

level causes an above-threshold noise level in upstream transmissions from the target receiver.

26. (withdrawn) The transceiver of claim 24, wherein the transmitter is configured to set the power level in part by selecting a signal constellation for transmitting data downstream.

27. (withdrawn) The transceiver of claim 24, wherein the transmitter includes a probabilistic trellis encoder to perform the encoding.

28. (withdrawn) The transceiver of claim 24, wherein the receiver includes a Viterbi decoder and is configured to scale 1D branch metrics used in the decoder in a manner responsive to reliability information derived from the received digital data.

29. (withdrawn) A receiver capable of receiving signals from a mixed channel that includes a digital network and an analog channel serially connected to the digital network, the receiver comprising:

a Viterbi decoder configured to process the received signals in a manner responsive to reliability information derived from the signals, the reliability information being indicative of potential magnitudes of quantization noise in the received signals.

30. (withdrawn) The receiver of claim 29, further comprising:

an adder configured to subtract an estimate of an echo level from each received signal and to transmit the echo-subtracted signal to the Viterbi decoder; and

a device configured to derive the reliability information from the received signals;
and

wherein the adder and device are coupled to obtain the received signals in parallel.

31. (withdrawn) The receiver of claim 29, wherein the received signals are representative of signal points belonging to constellations, and the reliability information

corresponding to ones of the received signals is a function of minimum distances of the constellations associated with the ones of the received signals.

32. (withdrawn) The receiver of claim 29, wherein the Viterbi decoder is configured to scale 1D branch metrics that are used in decoding in a manner that is responsive to the reliability information.